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ABSTRACT

This paper examines and summarizes the "Pierce-Gray Classification Model for the Cognitive, Affective, and Psychomotor Domains," a model developed for the classification of educational objectives. The classification system was developed to provide a framework that teachers could use as a guide when developing specific instructional objectives for students. In addition, it can be used to help achieve a degree of balance in the educational development of pupils. The Pierce-Gray model attempts to break down the barriers between the affective, cognitive, and psychomotor domains, and combines the three domains into one comprehensive, consistent, and interrelated classification system. The system is built upon the fundamental relationship between the domains, is consistent with current theory in all three domains, is easily understood and useable, and contains analogical relationships between the domains at each level. The model identifies six objective levels for each learning domain: (1) cognitive (perceiving, understanding, applying, analyzing, judging, and creating); (2) affective (perceiving, reacting, conforming, validating, judging, and creating); and (3) psychomotor (perceiving, activating, executing, maneuvering, judging, and creating). Each of these levels is in turn divided into two or three sublevels which are described in detail. (Author/JK)

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# EDUCATIONAL OBJECTIVES AND THE LEARNING DOMAINS

## A NEW FORMULATION

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# EDUCATIONAL OBJECTIVES AND THE LEARNING DOMAINS: A NEW FORMULATION

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Most educators would agree that instructional planning and the evaluation of instruction are most effective when teachers are clear about the objectives they hope to achieve. However, it is often true that insignificant (or trite) objectives take less effort to make clear and, in turn, may be easily developed and evaluated. The result, then may be learning that is of little consequence in terms of the array of knowledge and skills peculiar to a field of study, or of little meaning in relation to the needs of learners.

One procedure for avoiding problems such as these is the use of an approach for identifying basic categories for educational objectives, along with a workable system for classifying objectives into areas or levels within each category. The basic notion of simply sorting human endeavor into categories (or domains) can be useful as an aid in conceptualizing and defining the perimeters and tasks of education. A fully developed classification system provides a framework or base that teachers can use as a guide when developing specific instructional objectives for students. In addition, it can be used to help achieve a degree of balance in the educational development of pupils.

Over the years philosophers, psychologists and educators have attempted to categorize human behavior in various ways. Many such category systems can be utilized as the basis for the development of educational objectives and programs. Aristotle maintained that human beings were subject to a growth impulse which was expressed through three forms (or souls): The NUTRITIVE (or vegetative) form, the SENSITIVE (or animal) form, and the RATIONAL (or intellectual) form.[1] Thorndike identified what he termed the three constellations of abilities which were labeled

the LINGUISTIC, the MECHANICAL and the SOCIAL. Guilford identified the mental operations of cognition, memory, divergent production, convergent production and evaluation which the human organism utilizes in dealing with various types of content.[2]

Any one of the foregoing category systems could be used as the basis for organizing an educational program. However, the more comprehensive formulations of Upton[3] and Bloom/Krathwohl[4] are likely to be of more immediate value to educators concerned with categorizing educational objectives. The Upton and Bloom/Krathwohl approaches tend to parallel each other in the sense that they both classify human behavior into the basic categories of INTELLECTUAL, EMOTIONAL and PHYSICAL endeavors. Upton labeled his categories LOGICAL, AFFECTIVE and SENSORY. Bloom/Krathwohl labeled their categories the COGNITIVE, AFFECTIVE and PSYCHOMOTOR domains.

At present these three categories seem to hold the most promise as a means of identifying basic educational objectives. They appear to have a sound psychological base, and in particular, the Bloom/Krathwohl formulation is well known and accepted by educators and researchers and is used extensively in teacher education programs and in school systems.

The basic task of the school is to move students to higher levels and improved quality in <u>each</u> of the three domains. Unfortunately, the development of body machinery to attain mastery of psychomotor skills that will assist in body maintenance through leisure and work activities, the development of cognitive ability to enable judicious planning and problem solving, and the growth in moral reasoning to solve moral dilemmas <u>are not now</u>, and <u>have not been</u> givens in the historical goal setting of the educational enterprise. Even today, many opposing viewpoints about what is important in education and in life reflect the rich heritage of conflict between the domains. Who dares oppose the intellect of the

likes of Hutchins and his classic, "When I feel the urge to exercise, I lie down until it goes away," or Thomas Edison who felt that effort spent on exercise was wasted because it could have been spent thinking, or the master craftsman by the name of Henry Ford who said, "History is bunk."

Equally controversial is the continuing conflict over whether the schools should delve into the affective domain. Those who read them cannot forget the classic arguments presented by Robert L. Ebel, Theodore Brameld, Joseph Junell, and T. Robert Bassett in 1972 as they stated cases for or against including the affective domain as a function of schooling.[5,6,7,8]

Such conflicts do not stem from any illogic in the arguments for education in all three domains, but arise, at least in part, from the frustration felt when attempting to deal with the nebulous nature of the affective domain. After attempts to organize objectives in the cognitive domain into logical levels approached success, the pressure to do the same in the affective domain mounted as a partial answer to the problem of making sense out of a difficult area. This, of course, was soon followed by similar efforts in the psychomotor domain. The resulting classification models were not the product of a coordinated effort and unfortunately many problems related to category vagueness, domain relationships and practical applications remained unsolved.

If a classification model for educational objectives could be devised that, (1) was built upon the fundamental relationship between the domains, (2) was consistent with current theory in all three domains, (3) was easily enough understood so as to be useable by teachers, and (4) contained analogical relationships between the domains at each level, then fewer problems would be encountered by practioners. The "Pierce-Gray Classification Model for the Cognitive, Affective and Psychomotor Domains,"[9] was designed to accomplish the above tasks.

The Pierce-Gray classification model is based upon a particular interpretation of the meaning of the three domains of learning. To begin with, an important distinction is made between the hereditary set (and involuntary reflexes) of the developing organism, and the beginnings of learning. At birth, the organism can be thought of as an undifferentiated blend of sensations, uncontrolled movements, and unsorted nerve cell impulses. The infant inherits certain reflexes and response patterns that come into play automatically as he is bombarded by environmental stimuli. The Pierce-Gray model makes no attempt to deal with this preconscious phase of experience, but rather begins at that point where the first moment of meaning occurs.

The contribution of Albert Upton in sorting human behavior for educational purposes was mentioned earlier. Using the terms sensory (psychomotor), affective and logical (cognitive), he explained certain relationships between the three domains in Design for Thinking.[10] The authors are in agreement with Upton's position that the ability to identify similarities and differences between things is the basic intellectual skill upon which all thought is based. Hence, initial meaning, or perception, occurs when the brain makes a connection between two or more things; -thus, a unit of meaning is made up of a thing and the relation which connects it to another thing. Or stated another way, human learning begins when the brain is able to identify (or signal) a resemblance between two or more experiences. This type of perception, then, is the beginning of learning -the first moment of meaning. It is at this point that the classification model begins!

The individual is born with sensing organs and systems that might be thought of as the "machinery for keeping in touch" with the environment. This "machinery" transmits impulses which enable the brain to attach meaning to experience and consequently a potential (or readiness) for acting gradually develops. The sensory input into the brain may impress the left hemisphere (cognition) or the right hemisphere (affective) or both, and the body's machinery (psychomotor) is maintained to produce action based on emotional responses, cognitive thought, autonomic impulses or combinations of all three.

Each new perception or moment of meaning increases the organism's potential for action (action potential). The potential can be viewed from three different, but related, frames of reference, namely, (1) Potential for data manipulation (the Cognitive Action Potential), (2) Potential for "feeling" or emoting (the Affective Action Potential), and (3) Potential for muscular movement and motion (the Psychomotor Action Potential). (In the Pierce-Gray classification model, Level I of all three learning domains, is concerned with the development (or creation) of the organism's action potential. Level II is the "activating" category, and subsequent levels move the individual toward increasingly more complex and interrelated skills in each domain.)

As an individual matures he/she (1) develops and maintains senses and locomotor skills, (2) works to acquire cognitive abilities to manipulate the data input, and (3) struggles to gain control of the emotive reactions and channel them into positive forces and values. The body machinery's condition forces a limitation upon a person's potential physical skill, intellectual development, and value judgment ability, but for most individuals, their ultimate potential is beyond their own conceptualization. Thus, the interaction between the three domains can be viewed as a dynamic, developmental process that continues throughout life.

Before proceeding with a general description (or overview) of the new formulation it should be helpful to briefly examine the general types of behavior related to each domain, and also to point out certain of the relationships between the three domains.

The Cognitive Domain pertains to those mental processes that deal with knowledge (e.g., facts, ideas, concepts, etc.). This cognitive process is usually referred to as thought (or thinking). Human thought is capable of producing vast amounts of knowledge and is also intimately related to the production and refinement of both feelings and physical action. When an individual recalls facts, ideas

or concepts, or focuses thought in such a way as to use, alter, reorganize or generate knowledge, the behavior is classified as cognitive in the Pierce-Gray classification model.

The Affective Domain pertains to those mental and physical processes that produce feeling, emotion and commitment. However, it should be remembered that the cognitive use of knowledge influences the production and refinement of emotions or affective behavior. When an individual displays feelings, emotions or commitments, or focuses thought in such a way as to use, alter, reorganize or generate affective orientations, the behavior is classified as affective in the Pierce-Gray classification model.

The Psychomotor Domain pertains to those physical processes that produce bodily movement and activity. However, once again it should be emphasized that the cognitive use of knowledge influences the use and refinement of physical activities and skills. Also, the feelings, emotions and commitments of the Affective Domain influence the use and refinement of physical activities and skills. When an individual engages in bodily movement or activity, or focuses thought in such a way as to use, alter, reorganize or generate physical activity, the behavior is classified as psychomotor in the Pierce-Gray classification model.

Actually, all three learning domains interact with each other as individuals go about their daily lives. In certain activities one domain will dominate, while in another activity another domain may be dominant. The three domains do not operate as independent entities, even though it is convenient to separate them for purposes of analysis and study.

The work athletic coaches do to produce winning teams illustrates important relationships between the domains. In order to be victorious a coach must concern himself with all three domains. First, he must have players with good motor

coordination and certain physical skills (most of these can be achieved through successful recruiting or by rigorous practice schedules). Secondly, he must have a set of good strategies and workable game plans. Thirdly, he must maintain a sound emotional tone and team espirit de corps.

Another example illustrating domain relationships would be the work of a skilled surgeon. He must diagnose an illness, perform the operation and then monitor the recuperation of the patient. His knowledge of medicine is essential in the process of diagnosis, as well as when certain decisions must be made in the course of the operation. Prior to the operation the surgeon tries to gain the confidence of the patient, and afterwards he reassures the patient in an effort to promote recovery. As he performs the operation his skill in manipulating the instruments must be precise with little or no margin for error.

A final example from the area of sports illustrates domain relationships from a somewhat different perspective. After losing a game a coach or sports writer will often suggest reasons to account for the loss. Many of the common cliches or phrases used in such instances are efforts to identify the domain in which a dificiency existed that caused (or contributed to) the loss. What follows are simple cliches that once again illustrate how all three learning domains are interrelated with respect to a given activity or endeavor.

Cliches related to the Psychomotor Domain might include:

"Their team strength was awesome"

"Their coach just had horses to work with"

"They blew us out of the gym"

Cliches related to the Affective Domain might include the following:

"We were just down for the game"

"Practices were listless all week"

"They just were not to be denied today"

Cliches related to the Cognitive Domain might include:

"Their trick plays killed us"

"Our players weren't prepared for a zone defense"

"We went into a stall too early"

The Pierce-Gray model for the classification of educational objectives identifies 6 objective levels for each learning domain. The basic sorting factor between levels in all three domains is the increased degree of cognition required. Hence, as one moves upward through the levels, each new level can require more cognition than the last level. The chart on page 9 depicts the levels and sublevles for each learning domain. A careful examination of the domain chart can help one to conceptualize the basic structure (and relationships) of the classification system. For instance, when one views the chart vertically it is possible to discern a logical relationship between the levels within each domain. On the other hand, when viewed horizontally certain relationships between the domains (at each level) tend to emerge.

The first letters of the Cognitive, Affective and Psychomotor domains form a handy acronym (CAP), that can be used to visually represent certain of the relationships between the three domains (see representations on page 10). By placing the highest levels closest to the brain when the CAP is worn, the observer is reminded that these levels require the greatest amount of cognition. The three dimensional CAP diagram implies that all three domains are constantly influencing each other and that at any given level analogous relationships exist between the domains. For example, at the higher levels (such as JUDGING and CREATING), cognition is so important to the Affective and Psychomotor domains that there are no definite lines drawn between domains. As the degree of cognition decreases at the lower levels of the Affective and Psychomotor domains the distinctions between the domains at each level become increasingly more obvious.

## PIERCE-GRAY CLASSIFICATION MODEL FOR THE COGNITIVE, AFFECTIVE AND PSYCHOMOTOR DOMAINS

(DECIPHERING THE LEARNING DOMAINS)

| COGNITIVE DOMAIN | AFFECTIVE DOMAIN | PSYCHOMOTOR DOMAIN |
|---|---|---|
| 1. COGNITIVE PERCEIVING | 1. AFFECTIVE PERCEIVING | 1. PSYCHOMOTOR PERCEIVING |
| 1.1 Focusing | 1.1 Emotive Imprinting | 1.1 Sensory Transmission |
| 1.2 Storing | 1.2 Response Setting | 1.2 Physiofunctional Maintenance |
| 2. UNDERSTANDING | 2. REACTING | 2. ACTIVATING |
| 2.1 Retrieving | 2.1 Emoting | 2.1 Physical Outputs |
| 2.2 Rendering | 2.2 Recognizing | 2.2 Mimicry |
| 2.3 Conceptualizing | 2.3 Controlling | 2.3 Deliberate Modeling |
| 3. APPLYING | 3. CONFORMING | 3. EXECUTING |
| 3.1 Routine Application | 3.1 Artificial Attitude | 3.1 Task Execution |
| 3.2 Procedural Application | 3.2 Consistent Attitude | 3.2 Operational Execution |
| 3.3 Complex Application | 3.3 Rationalized Attitude | 3.3 Skilled Execution |
| 4. ANALYZING | 4. VALIDATING (Processing Values) | 4. MANEUVERING |
| 4.1 Comparative Analysis | 4.1 Examining Values | 4.1 Inspecting Skills |
| 4.2 Logical Analysis | 4.2 Accepting Values | 4.2 Selecting Skills |
| 5. COGNITIVE JUDGING | 5. AFFECTIVE JUDGING | 5. PSYCHOMOTOR JUDGING |
| 5.1 Establishing Ideational Criteria | 5.1 Establishing Value Criteria | 5.1 Establishing Performative Criteria |
| 5.2 Ideational Judging(Criterial based decision from alternatives) | 5.2 Value Judging(Criterial based decision resolving value conflict) | 5.2 Performative Judging (Criterial based decision from alternatives) |
| 5.3 Uniting Ideas | 5.3 Integrating Values | 5.3 Combining Skills |
| 6. COGNITIVE CREATING | 6. AFFECTIVE CREATING | 6. PSYCHOMOTOR CREATING |
| 6.1 Ideational Diverging | 6.1 Valuative Imagining | 6.1 Performative Exploring |
| 6.2 Creative Insight | 6.2 Inspirational Insight | 6.2 Performative Insight |

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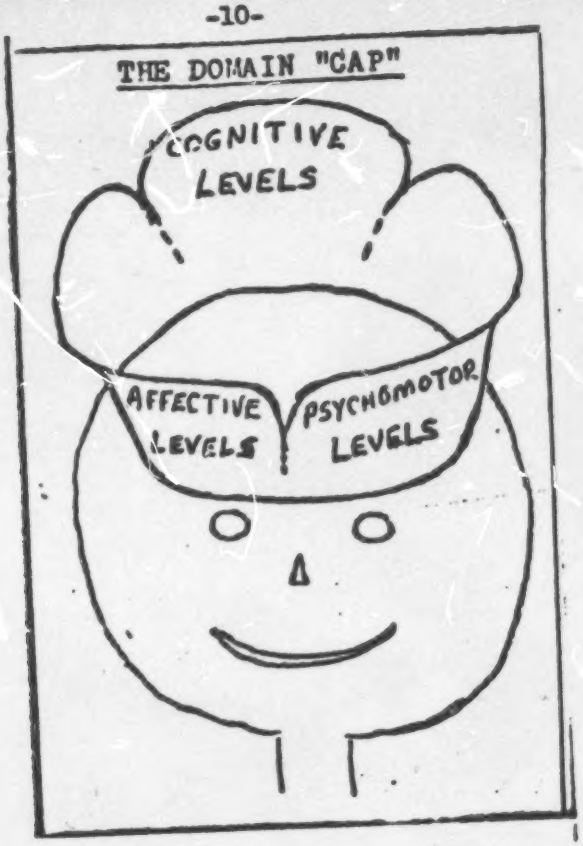
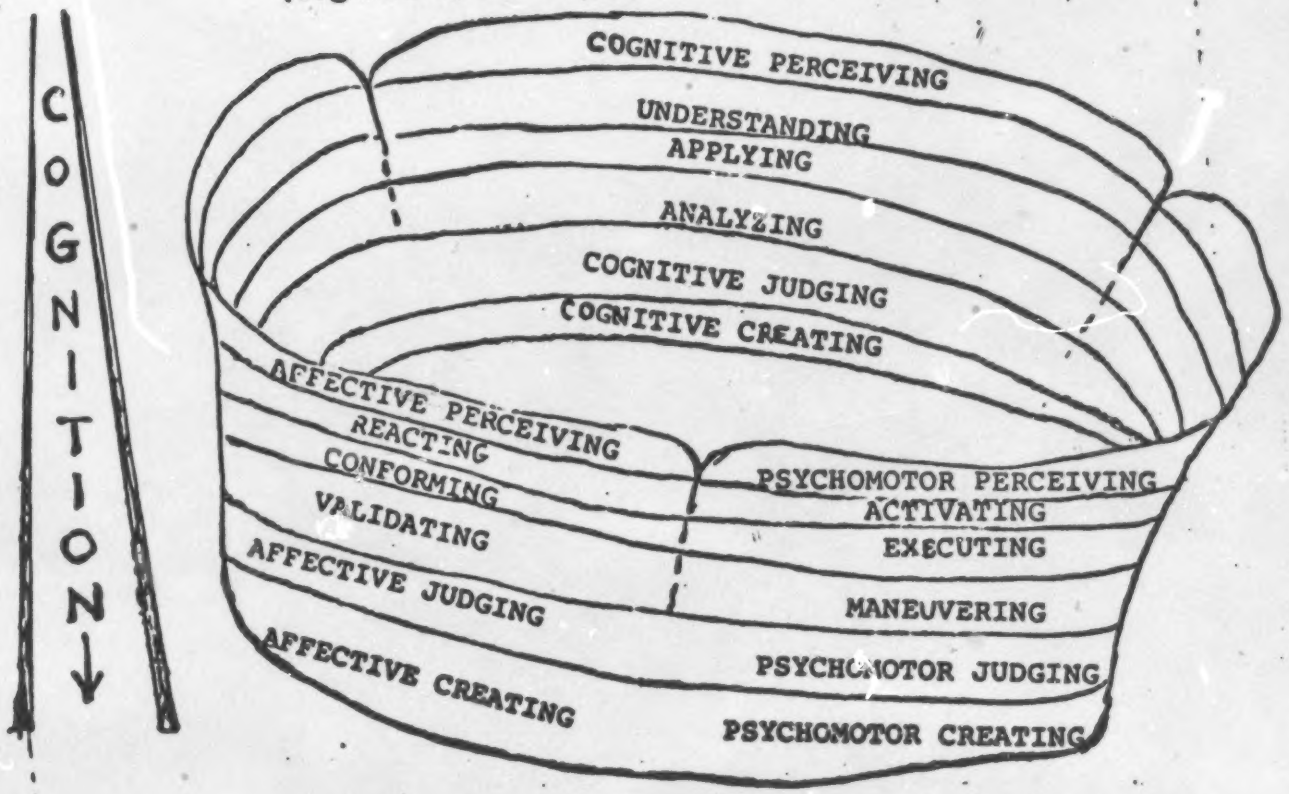



THE DOMAIN CAP
(Cognitive/Affective/Psychomotor)



As noted above, the Pierce-Gray classification system utilizes the Cognitive/Affective/Psychomotor model for categorizing human behavior. Other classification systems have also used this model. Why then, is a new formulation for the three domains needed?

Basically, the Pierce-Gray classification system attempts to do something that no other system has done. Namely, to break down the barriers between domains and combine the three domains into one comprehensive, consistent and interrelated classification system that can be used with ease by teachers! The set of characteristics listed below tend to distinguish the Pierce-Gray system from other schemes for classifying educational objectives.

(1) Common Sorting Factor. The system utilizes a common sorting factor between levels in all 3 domains. This means that each level in the system requires an increased degree of cognition beyond what was required at the last level.

(2) Internal Consistency. The system includes a logical and internally consistent step-by-step progression of levels within each domain (and the same number of levels per domain). For example, when Level II is attained, Level III is the next logical step. Thus, in a sense, Level II objectives help prepare one for Level III objectives.

(3) Analogous Relationships. The system employs clearly discernable analogous relationships across (or between) the 3 domains at each level. Thus, at Level III in all 3 domains somewhat similar operations, activities and/or thinking is involved.

(4) Ease of Mastery. Because of a common sorting factor, internal consistency and analogous relationships the Pierce-Gray classification system should be relatively easy for teachers to learn and use. Hence, the teacher should be able to generate a wide range of objectives related to his/her teaching field and to the needs of students.

NOTES

1. Carlton H. Bowyer, Philosophical Perspectives for Education, Glenview, Ill.: Scott Foresman and Co., 1970. p. 123. W. T. Jones, A History of Western Philosophy, New York: Harcourt Brace, 1952. pp. 194-201.

2. J. P. Guilford, The Nature of Human Intelligence, New York: McGraw-Hill, 1967.

3. Albert W. Upton, Design for Thinking, Palo Alto, CA.: Stanford University Press, 1961.

4. B. S. Bloom, D. R. Krathwohl, B. B. Masia (et. al.), Taxonomy of Educational Objectives, Handbook I: Cognitive Domain, New York: David McKay Co., Inc., 1956.

5. Robert L. Ebel, "What are Schools For?" Phi Delta Kappan, Vol. LIV, No. 1, September 1972, pp. 3-7.

6. Theodore Brameld, "Education as a Self-Fulfilling Prophecy," Phi Delta Kappan, Vol. LIV, No. 1, September 1972, pp. 8-11.

7. Joseph Junell, "The Limits of Social Education," Phi Delta Kappan, Vol. LIV, No. 1, September 1972, pp. 12-15.

8. T. Robert Bassett, "Its the Side Effects of Education that Count," Phi Delta Kappan, Vol. LIV, No. 1, September 1972, pp. 16-17.

9. Walter D. Pierce and Charles E. Gray, Deciphering the Learning Domains, New York: David McKay Co. (Longman, Inc.), (Accepted for publication, not yet released)

10. Ibid., Upton.

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SUMMARY

# PIERCE-GRAY CLASSIFICATION MODEL FOR THE COGNITIVE, AFFECTIVE AND PSYCHOMOTOR DOMAINS

The following material is adopted from Deciphering the Learning Domains by Walter D. Pierce and Charles E. Gray, copyright 1977.

## The Cognitive Domain

### LEVEL I - COGNITIVE PERCEIVING

What is it that makes up the fundamental cognitive ingredient? Perhaps one of the most penetrating analyses of this question was made over a century ago by Charles Kay Ogden and I.A. Richards in their essay The Meaning of Meaning,[1] and became a basic component of Upton's Design for Thinking.[2] Meaning, or perception, is the process of identifying an entity. But "nothing ever means itself alone; it can only be meaningful to somebody about something else. Meaning, then, is simply a function of the cortex in action; it is what goes on in a brain when it makes a connection between two or more things..... A unit of meaning - that is, a meaning that cannot at the moment be practically broken up into two or more lesser meanings - is made up of a thing and the relation which connects it to another thing.....(I)n order to be conscious of a finite thing ....., we must have at least two other things: a boundary and another infinite of indefinite thing....."[3]

"This means that the first moment of consciousness (perception) takes place when the meaningful moment is connected with previously experienced but meaningless moments by the image symbol. It is therefore by no means nonsensical to say that when we are conscious

of any given experience for the first time, we must be conscious of at least one other experience similar to it, likewise for the first time. (Perception is) simply that first act of signaling the resemblance of the two now-meaningful experiences to one another by what we have called a genus term."[4]

Attempts to deal with animal intelligence seem to define such intelligence as being very close to our definition of Perception, but without the crucial factor of language. Language allows us the ability to apply the genus term to similar experiences. Hence, an essential difference between man and the animals is identified.

The organism is born with sensing organs and systems that might be thought of as the "machinery for keeping in touch" with the environment. This "machinery" transmits impulses which enable the brain to attach meaning to experience and thereby gradually develop a potential (or readiness) for acting. Each new perception or moment of meaning increases this action potential. This potential can be viewed from three different, but related, frames of reference, namely, (1) Potential for data manipulation (the Cognitive Action Potential, (2) Potential for "feeling" or emoting (the Affective Action Potential), and (3) Potential for muscular movement and motion (the Psychomotor Action Potential). In the Pierce-Gray classification model Level I, of all three learning domains, is concerned with the development (or creation) of the organism's action potential (and Level II is the "activating" category for all domains).

Before proceeding further it seems imperative to make a distinction between the hereditary set (and involuntary reflexes) of the

developing organism, and the beginnings of learning. The newborn infant inherits certain reflexes and response patterns that come into play automatically as she/he is bombarded by environmental stimuli. Thus, at birth, the organism can be thought of as an undifferentiated blend of sensations, uncontrolled movements, and unsorted nerve cell impulses. This classification model makes no attempt to deal with this pre-conscious phase of the infant's experience, but rather, it begins at that point where the first moment of meaning occurs.

For this classification scheme, Cognitive Perceiving is defined as the student's ability to (1) identify bits and pieces of data, and (2) store them in the memory bank. Much of this is done in terms of words or other symbols and the initial development of this ability takes place at an early age. One could draw a parallel to the work of Piaget. The initial development of Perception could be thought of as the process of assimilation and accommodation of data on the child's growing schemata. In students, this basic ability in isolating and inputing into the brain in the form of language and other symbols has begun long before they reach the classroom. Objectives are seldom written at this level by regular classroom teachers.

Sublevel 1.1: Focusing

To further define these operations, sublevel 1.1 - Focusing, is described as being the moment at which meaning first comes into existence because of the perception of relations (such as "figure-ground" relationships or "thing, boundary, other thing" distinctions).

Sublevel 1.2: Storing

Sublevel 1.2 - Storing, then logically follows as these distinctions and item identifications (i.e., Cognitive Action Potential) are inputed into the storage system of the brain, usually through the use of language and the genus term.

LEVEL II - UNDERSTANDING

At the understanding level, the individual retrieves input and begins to manipulate the data on cue. She/he comprehends a request or circumstances and can withdraw from the brain appropriate items. She/he can demonstrate the retrieval by stating things word for word or she/he may change their form and put them in his/her own words. She/he may demonstrate his/her understanding by changing information from one set of symbols to another while retaining the essential meaning. Ultimately, she/he is able to extract meaning and significance from information and explain how it is related to other things she/he has learned.

Sublevel 2.1: Retrieving

At sublevel 2.1 - Retrieving, the individual understands a request for information or an appropriate time to retrieve information and does so.

Sublevel 2.2:- Rendering

At sublevel 2.2 - Rendering, the individual is able to repeat (or rephrase) material in a way that is consistent with the original(s) that she/he has inputed. She/he can summarize paragraphs or outline chapters and retain the meaning. She/he can change content from one set of word arrangements (or combinations) to another. She/he can duplicate given symbols or diagrams at a later time. She/he can recall the appropriate English word that is synonymous with another

English word or a French word.

Sublevel 2.3: Conceptualizing

At sublevel 2.3 - Conceptualizing, the individual can explain the meaning and significance of data rendered. Conceptual models are fully understood along with their relationship to other models. The individual can explain something as simple as the relationship of parents to children, or something as complex as the theory of relativity and its impact on the scientific community. This, of course, does not imply that the content itself was necessarily inputed through any process higher than cognitive perceiving, retrieving and rendering. However, it is quite likely that before a high level of conceptualizing is reached certain higher order skills will have come into play to assist in the attainment of full conceptualization.

LEVEL III - APPLYING

At the Applying level the individual uses simple or complex rules, procedures or principles to accomplish particular tasks.

Sublevel 3.1: Routine Application

Often an individual who is engaged in a cognitive task can utilize simple rules, procedures or principles in an automatic way. She/he is able to call the rules up and use them with little thought. If necessary, however, explanations could be given (Rendering); or the individual could even specify the relationship of the principle to other principles or provide reasons for the use of the rule or principle (Conceptualizing). In actual practice, however, the rules and principles are applied in routine fashion,

without need for concentration. Examples of such routine application are basic arithmetic computations, the filling out of simple application forms (with specific directions), playing simple games using a few rules, and use of a routine procedure for locating specific library materials.

Sublevel 3.2: Procedural Application

The next sublevel is somewhat more complex. Here a procedure is understood and used consistently in varying circumstances. At this sublevel the individual may be presented with a mathematical problem involving several computations and must remember several rules and then use them in order to be able to derive the correct answer. She/he may be able to correctly fill out a scorebook for a basketball game. Or she/he may translate paragraphs from Spanish to French, where words are retrieved and then a particular word arrangement (sentence structure) is developed through Procedural Application. Also, she/he can fill out more involved forms (e.g., federal income tax form) in which the directions (rules) are sometimes easy and sometimes more difficult; she/he can engage in simulations and games with involved rules; and she/he can use a wide variety of research procedures to gather proper input for later analysis.

Sublevel 3.3: Complex Application

At sublevel 3.3, Complex Application, the rules and procedures are so involved that some specialized training may be needed in order to properly apply them. While the layman may be able to fill out most income tax forms by the rules, there is a point at which the tax

regulations are so complex that their application is almost reserved to certified public accountants. Similarly, the expertise of a chemist, mathematician, or lawyer are needed in the application of complex rules, principles and regulations peculiar to their fields.

If, in the application of the principles, the individual must compare the uniqueness of a situation to other similar situations and deduce the more applicable rule among many possibilities, she/he has moved to the first sublevel of Analysis, 4.1 Comparative Analysis.

LEVEL IV - ANALYZING

Analysis can be thought of as problem solving through the identification of similarities and differences between a given problem and other problems or circumstances an individual has previously encountered. She/he attempts to find "the answer." An implication of analysis is that there is either a best or a right answer that the individual should work toward.

Sublevel 4.1: Comparative Analysis

At sublevel 4.1 Comparative Analysis, the student identifies similarities and differences between sets of circumstances, descriptions or phenomena. When asked to compare the Russian and American revolutions he/she can locate similar and different events, attitudes and results.

Sublevel 4.2: Logical Analysis

At sublevel 4.2 Logical Analysis, the individual induces a rule, generalization, concept or principle through identification of similar attributes found in a series of examples. She/he may find that in subtraction that when the subtrahend has a nine in the one's

column, that the digit in the answer in the one's column is always one more than the digit in the one's column in the minuend. If given a pile of rocks, she/he is able to induce three categories because metamorphic, sedmentary and ignious rocks each have distinguishing characteristics.

Similarly, the individual uses logic and comparisons to determine answers, or uses principles, rules, generalizations, or concepts to make inferences that help to clarify or explain a particular phenomenon (or relationship). When asked to explain why ice is floating in one beaker on a clear liquid and not floating in an adjacent beaker, she/he identifies analogous situations in his/her past that could explain the phenomenon and asks questions to deduce the reason why. When presented with a hypothetical math word problem, the student compares the situation to others she/he has experienced and deduces by trial and error the correct formulas and procedures.

LEVEL V - COGNITIVE JUDGING

In dealing with life situations individuals just as often face circumstances in which there is not a "correct" or "right" answer as when there is. Varying from what tie to wear in the morning to the choice of an occupation, people make choices based on the data that is available. This process is continuous and cyclical. In order to make a judgment, criteria for making the decision must be determined through analysis and evaluation. Based on the criteria the final decision is made. Criteria are continuously being altered and thus ultimate judgments continue to vary. Occasionally individuals may set up criteria for making judgments about the way something

should be assembled in efforts to fashion a new concept or theory.

Sublevel 5.1: Establishing Ideational Criteria

Individuals feel most comfortable in the process of selection from alternatives, when they have judged a set of criteria as being workable and worthwhile for them. They may even be reluctant to examine the criteria in order to make changes, because to do so may alter a comfortable judgment process. However, in the process of cognitive judging, people continually formulate and examine sets of criteria that are used in making choices between ideas.

Once the judgments about the selection of criteria have been established the act of ideational judging becomes possible. It may be a difficult process not because of the final act of judgment, but because the slate of criteria may necessarily take into account conflicting factors. For instance, when faced with a job offer, a presently employed person may balance criteria including:

(1) Distance to travel to work (further than at present)
(2) Salary (more money in new job)
(3) Job security (slightly less than current job)
(4) Fringe benefits (better in new job)
(5) Chances for promotion (slightly better in new job)
(6) Philosophy of superiors (company rather than employee minded in new job)
(7) Size of company (smaller than at present)

If the employee can judge the priorities of the criteria the ideational judgment follows easily.

Sublevel 5.2: Ideational Judging (Criterial based decision from alternatives)

At this sublevel the individual renders his decision based on his/her assembled criteria. She/he, if necessary, can explain those rationales upon which the judgment was made.

Sublevel 5.3: Uniting Ideas

When an individual begins efforts to logically unite ideas to formulate new products, the process described at sublevels 5.1 and 5.2 repeats itself, but with a new concept or whole as the result.

When studying the relationships between ideas and concepts the individual determines similarities and differences and ultimately makes judgments about how the notions could fit together. This judgmental process of uniting ideas can produce, after assembly, a product of some difference from the original pieces when unassembled. Thus, the individual may put together a travel itinerary for a five day trip to New York or plan a day's menu that encompasses items from each food group. The "parts" of the product are not new, but the arrangement, sequence or total configuration is original for the individual. Different individuals would produce different products simply because their judgments would be different. That is, they would use different criteria as their basis for selection of parts.

It is possible for this process to approach elements of creativity, but as long as the actual combining of ideas, concepts or principles is based on logic and judgment, the individual is operating at sublevel 5.3 Uniting Ideas.

LEVEL VI - COGNITIVE CREATING

Sublevel 6.1: Ideational Diverging

When operating at the leading edge of knowledge, it is possible for the individual to allow him/herself moments of ideational divergence. In these instances the individual may be attempting

to tap into Jung's "Collective Unconscious," allow disjointed synapses in the brain to make connections, engage in a brainstorming session, tinker with metaphor or other devices to free the mind. When so engaged, the individual is operating at sublevel 6.1 Ideational Diverging.

Sublevel 6.2: Creative Insight

On occasion, after being involved in the process described above, the phenomenon of genuine creativity may take place in an insightful flash. When this occurs the individual reaches sublevel 6.2 Creative Insight.

## The Affective Domain

LEVEL I - AFFECTIVE PERCEIVING

As with the lowest level in the cognitive domain, it must be remembered that the sensory apparatus has conveyed signals to the brain for input. These sensory signals may impress the left hemisphere (cognitive) or the right hemisphere (affective). As discussed earlier, the first moment of meaning is cognitive, and future inputs of similar stimuli may be routinely processed by the left hemisphere (i.e., cognitively). However, when the first moment of meaning occurs it will be accompanied by a set of circumstances that may influence the right hemisphere, thereby altering the way in which such inputs are processed in the future. Hence, if the original stimulus is of sufficient intensity and magnitude, then the next similar input may initiate an emotive response automatically, without a cognitive qualification.

Sublevel 1.1: Emotive Imprinting

The process of affective perception may be broken down into two stages. The first, sublevel 1.1 - Emotive Imprinting, is described above. The sensory machinery transmits impulses to the right hemisphere which receives the input.

Sublevel 1.2: Response Setting

The sensing process sets the stage for sublevel 1.2 - Response Setting, where the brain begins to build a capacity or readiness for reaction (i.e., Affective Action Potential). This "imprinting" creates an inclination - an emerging predisposition or affective set - that may influence later emotive reactions. If there has been a predominate imprint, a fixation may occur which creates an affective action potential that may later produce involuntary emotive reactions.

LEVEL II - REACTING

The basic human emotion is a generalized state of excitement which can be described as undifferentiated emotion-in-general. Gradually the infant is able to differentiate more specific emotions from this general state of emotional excitement. The earliest differentiations are the emotions of distress and delight. Distress can be defined as excited avoidance behavior, whereas delight can be categorized as excited approach (or adience) behavior. The two basic patterns of human emotional response are derived from these beginnings. The simple emotional responses of infants are merely refinements of the emotions of distress and delight. These two emotional patterns also can be discerned in the behavior of older children and adults, even though emotional responses have become rather complex and, hence, are more likely to be blends of both

emotional and intellectual experiences. Some of the terms used to imply various emotions derived from the two patterns of development are as follows:

| Distress | Delight |
|---|---|
| Anger (and Rage) | Elation |
| Disgust (and Dislike) | Affection |
| Fear | Joy (and Surprise) |
| Jealousy | Euphoria |
| Shame (and Embarrassment) | Nostalgia |

As previously discussed, the potential for emotional response (i.e., Affective Action Potential) is developed at the Affective Perceiving level. At the Reacting level, the Affective Action Potential is expressed through emotional behavior and the individual gradually becomes aware of its existence, understands how it is activated, and is able to exercise a degree of control over it. Thus, the affective potential is activated, recognized and brought under control at the Reacting level.

Sublevel 2.1: Emoting

As commonly used, the term "emotion" implies a low level or lack of cognition; hence, the concept seems appropriate as a label for the basic affective reaction. It would include those instances where an individual is apparently unable (albeit, temporarily) to cognate about a situation. The individual undergoing the reaction does not cognitively decide what the emotion will be - she/he simply engages in it!

Often the reason for the emotional reaction may be difficult or impossible for an observer to discern. However, in certain circumstances the cause-effect relationship is more easily identified than

in others. For instance, an emotion such as rage implies no, or almost no cognition and the reason for the rage may be totally obscured to the observer. However, in the case of surprise or embarrassment, the stimulus may be rather obvious.

If an emotive reaction continues to reoccur over and over again, it may be thought of as an emotional trait - i.e., one in which the affective "imprint" dominates. In such instances the individual may become increasingly aware of it, perhaps between exhibitions of the reaction. However, she/he still may be unaware of its cause, and has very little or no control over its existence.

Thus, emotional displays, whether singular or repetitive, which are apparently involuntary and are accompanied by little or no cognition on the part of the individual, will be classified at sublevel 2.1 - Emoting.

It is at this sublevel that the spectrum of deep seated psychological problems enter into the affective model. An in-depth analysis of such problems is the province of the specialist in mental hygiene and beyond the scope of this book. For the practicing teacher, occasional emotional outbursts at the emoting level are encountered as a matter of course in teaching. When these are not repetitive, they are of little concern as long as the behavior exhibited is not harmful. However, when repetitive outbursts are encountered, the teacher must decide if the behavior is detrimental to the class and, if so, if it can be altered through teacher attention or whether the assistance of a specialist is needed.

Sublevel 2.2: Recognizing

At this sublevel cognition emerges as an important factor in relation to the individual's emotional reactions. Also, the reasons for the reactions become easier for an observer to identify. When the student exhibits reactions that are repetitive and involuntary, but can be made increasingly aware of their existence and cause, she/he is operating at sublevel 2.2 - Recognizing.

The emotional reactions at this sublevel are of a nature that allow the individual to discuss them soon after their occurrence with some degree of cognition. In addition, the student's level of awareness may be of sufficient magnitude for the teacher to begin assisting him/her in discerning possible causes (or reasons) for the reactions.

The teacher can make use of many student reactions at this sublevel as initial learning stimuli in the classroom. The resourceful teacher can utilize many such reactions for purposes of set induction prior to full cognitive understanding.

Sublevel 2.3: Controlling

As awareness and understanding increase the individual may be prompted to begin thinking about altering a reaction in some way, combining it with other reactions, or even eliminating it. Such concerns imply that the individual is now ready to bring an emotional reaction more fully under control. Hence, she/he has moved to sublevel 2.3 - Controlling. At this level the student further clarifies

his/her emotional reactions, gains a degree of control over their existence, and begins to think about their continued existence, alteration, or elimination with reference to his personal comfort and satisfaction.

LEVEL III - CONFORMING

After being activated, recognized and controlled at the Reacting level, many emotional reactions become well established predispositions or attitudes that consistently pattern behavior at the Conforming level. Ultimately, social pressures and expectations prompt the individual to seek out convenient ways to .ationalize his/her attitudes and behavior.

Sublevel 3.1: Artificial Attitude

After gaining a degree of control over his/her emotional reactions, the individual begins to develop preferences and attitudinal predispositions toward particular ideas, situations and behaviors. She/he can describe what his/her preferences are in relation to suggested ideas and is fully aware of the attitudinal stance from which he/she operates, but she/he can give virtually no reasons for his/her position(s). When asked why she/he likes something she/he is likely to respond by merely articulating his/her preference differently or in stronger terms. For example, when asked to discuss his/her attitude about ecology, she/he merely states that she/he likes the idea of environmental preservation, but cannot readily supply reasons for holding such an attitude. Thus, when an individual is apparently satisfied and comfortable with the attitudinal stance she/he has assumed, and

is either disinclined or unable to provide reasons for holding it, she/he is operating at sublevel 3.1 - Artificial Attitude.

Sublevel 3.2: Consistent Attitude

At this sublevel, particular attitudes and preferences have become established parts of the individual's affective reportoire. She/he behaves in a particular way over and over again, and comes to feel that his/her reaction is correct and proper. The response has become ingrained through repetition and is now quite predictable. For the most part, the individual views his/her feelings and behaviors as natural, correct and inherently good in their own right; however, when pressed, she/he may offer superficial supportive rationales in an off-hand manner.

Sublevel 3.3: Rationalized Attitude

At this sublevel the individual comes to recognize the need to rationalize his/her attitudes, and begins to supply rationales in support of his/her responses to encountered ideas, notions or situations. These rationales are not based on reflective thought, but rather they are supplied after the fact to support an attitudinal stance. The individual searches about, locates a reason that appears to be convenient or socially acceptable, and applies it to the situation. Thus, the individual is unconcerned about the worth of the rationale, other than that it should be acceptable to other people. There is no attempt to qualify or critically examine his/her thinking. For example, she/he may have grown up in a Democratic household and knows that she/he likes Democrats. When asked why,

she/he may respond that "Roosevelt and the Democrats got us out of the depression," simply because she/he heard it at home. Most people tend to operate predominately at sublevel 3.3 Rationalized Attitude when engaged in their routine daily activities and pursuits.

LEVEL IV - VALIDATING

At some point in time the individual begins to examine his/her conforming attitudes (and the rationales offered in their support), and determines whether or not she/he personally can believe in them. At this level of the model she/he cognitively processes the attitudes. That is, she/he examines them carefully in terms of alternatives and consequences, and ultimately accepts (or rejects) them for specific reasons.

Sublevel 4.1: Examining Values

At the lowest validating level the individual detects that a rationale that she/he has often used for an attitude needs to be examined for its merits. This act of cognitive examination has moved the individual's stance from a conforming attitude to the sublevel 4.1 Examining Values. At this level the individual carefully examines a possible value (and its rationale) from many angles in an effort to ascertain its acceptability. It is compared and contrasted with similar or alternative values and rationales (including those already accepted); and its consequences are made as explicit as possible. Ultimately, the value (with its alternatives and consequences considered) is related to his/her own experience, and becomes a candidate for acceptance or rejection.

Sublevel 4.2: Accepting Values

As this validation of values takes place, values and their rationales are decided upon, and the individual "collects" a group of values. Any particular value can be defended, by itself, with some degree of assurance on the part of the individual. When a value reaches this stage, it is at sublevel 4.2 Accepting Values. At this level the individual either accepts or rejects the value as important to his/her life; in short, it becomes a matter for personal commitment for specific reasons. The reasons (or rationale) offered in support of the decision may take either one (or a combination) of the following forms:

(a) Consequential reasons (or rationale): Where the value is deemed to lead to consequences which previously have been chosen as acceptable to the individual.

(b) Criterial reasons (or rationale): Where the value is analyzed as being consistent with criteria (or principles) which previously have been chosen as acceptable to the individual.

LEVEL V - AFFECTIVE JUDGING

The Affective Judging level includes three distinct but related types of value-related judgments. They are: (a) Judgments related to the formulation of criteria that can serve as the basis for ordering and choosing between values, (b) Judgments related to the resolution of particular value conflicts, and (c) Judgments related to intergrating, reorganizing and/or reformulating the total value system.

Sublevel 5.1: Establishing Value Criteria

The process of examining and accepting or rejecting particular values takes place at the Validating level. As a result of this

validating process the individual becomes committed to a set of values, (i.e., grounded beliefs) that influence his/her behavior in a variety of circumstances.

In the give-and-take of daily life the individual encounters situations and has experiences that prompt him/her to think about accepted values collectively. As a result of new experience, increasing value diversity and the growing complexity of his/her value system, the individual is faced with the prospect of having to choose one value over another in certain situations. Hence, she/he begins to develop a set of value criteria that can be used as the basis for (a) ordering accepted values (setting priorities), (b) making choices between accepted values, and (c) screening new values. Thus, at sublevel 5.1 Establishing Value Criteria, the individual develops, internalizes and makes explicit the principles or criterial base for ordering, choosing between and screening values.

Once established, the value criteria will promote consistency and expedite the processing of values at the Validating level. But most importantly, in a particular situation the individual can now identify the relative importance of a given value (to him/her), and can explain why (using internalized value criteria) it is more or less important than related values. He/she is now prepared to deal with value conflict situations (i.e., value dilemmas) at the Value Judging sublevel. For example, a person who values both honesty and kindness may find himself in a situation where being honest with a very close friend will deeply hurt the friend's feelings. Thus, the individual is forced to choose between honesty and kindness. In such

value conflict situations, the person's established value criteria are brought into play as a guide in making the value judgment.

Sublevel 5.2: Value Judging (Criterial based decision resolving value conflict)

When an individual is confronted with a value conflict, she/he is in a position where she/he is forced to make a decision (or choice) between two or more values of importance to him/her. In dealing with such a dilemma at the Value Judging sublevel, the individual will allow varying degrees of cognition and previously established value criteria to influence his/her decision.

When the individual makes use of his/her established value criteria in rendering a value judgment she/he is operating at sublevel 5.2 Value Judging. The value conflict is "resolved" by a judgment based on the nature of his/her value criteria and the type of affective-set that has evolved within his/her value system. If asked, she/he can describe the principles or criteria upon which the judgment is based.

Sublevel 5.3: Integrating Values

When the individual is involved in the process of re-examining, relating, reassessing and reformulating his/her accepted values, established value criteria and value judgments she/he is operating at sublevel 5.3 Integrating Values.

With respect to his/her accepted values, the individual relates new values to older values; older values are related to each other; and the new and the old are classified and re-classified with respect to their similarities, differences, consistencies, inconsistencies and

the types of circumstances in which they become activated. The individual is working toward developing a unique integrated system of values that is internally consistent, logical and workable in the give-and-take of daily life.

With respect to his/her value criteria and value judgments, the individual may find that she/he is no longer satisfied with the value criteria she/he is using. At this point she/he may examine and revise his/her value criteria (i.e., return to sublevel 5.1 above) and render judgments about them. Thus, she/he becomes involved in a cycle of judgments using the value criteria, followed by interim judging and revising of the criteria. In such instances, the individual is actually examining and judging the mode of reasoning used in making judgments. She/he has come to reflect upon his/her choices and how they were arrived at; she/he can introspectively analyze and evaluate his/her own criteria (i.e., question their usefulness, examine alternative criteria, ponder possible changes, etc.). Regardless of his/her present approach to value conflicts, she/he has now assumed a stance whereby she/he is willing to consider types of reasoning other than his/her own and may be able to develop and adopt broader, more flexible ways of viewing and dealing with value conflicts.

LEVEL VI- AFFECTIVE CREATING

At the highest level of the Affective Domain the individual is able to activate what has been termed the creative imagination - essentially, the capacity to visualize, to foresee, and to generate unique values. The process of imagining may result in the creation of a new product - a unique insight. The functioning of the creative

imagination has been identified as the highest type of human mental activity by many perceptive laymen and by scholars involved in research in the field of creativity. However, the creative imagination should not be viewed as a phenomenon or activity unique to the Affective Domain; it quite obviously operates across all three domains at the 6.1 sublevel.

Sublevel 6.1: Valuative Imagining

The exact way in which valuative imagining is activated is somewhat obscure, but apparently it is related to encountered problems and/or feelings of dissonance and the consequent urge or desire to reflect upon the meaning(s) of experience (or existence) in a broad context with few constraints. The process may develop and proceed in the following manner. First, the individual perceives some kind of a "problem" relative to his/her value structure and after considerable reflection about the functioning of his/her system of values, she/he may seek out and examine alternative modes of valuing. This may prompt him/her to ponder the possibility of hybrid value systems containing elements of several systems in addition to his/her own. In turn, she/he may begin to think about unusual value formulations that are not directly related to any particular known system. Eventually, she/he may create or "discover" new value patterns or configurations that relate or encompass broad segments of human experience. (A variety of approaches have been suggested for triggering the creative imagination, including the metaphorical approach known as Synectics).[5]

Sublevel 6.2: Inspirational Insight

On occasion, after being involved in the process described above, the individual may experience a "flash of insight" that is totally (or largely) unique and apparently not a direct "spin-off" or a logical implication of any of his previous patterns of throught. In such instances she/he has achieved what is herein termed sublevel 6.2 Inspirational Insight.

For centuries many Eastern religious and philosophical systems have emphasized special techniques and disciplines designed to promote inspirational insights. The disciplines of Yoga and Zen Buddhism are two well known examples. Many similar, but less rigorous "mind expanding" techniques have been advocated in recent years.[6] Throughout history many creative, intuitive and unique insights, with obvious affective overtones and value orientations, have been attributed to moral and religious philosophers, to social theorists, and to many influential but less well known individuals. For example, in the realm of religion and moral philosophy, apparent inspirational insights are associated with Gautama Buddha, Lao-tzu and Mohammed. In the more secular realms, the names of theorists such as Plato, Descartes and Gandhi come to mind. It should be noted, however, that in most instances of insight the cognitive and affective components are intimately related and merged together in such a way as to be almost inseparable.

## The Psychomotor Domain

LEVEL I - PSYCHOMOTOR PERCEIVING

Sublevel 1.1: Sensory Transmission

The fundamental physical process of the human body is the transmission of data through the sensory channels to the central nervous system. This is accomplished when the senses activate nerve channels that carry signals (or "messages"). Signals related to hereditary body functions are automatically routed to the autonomic (involuntary) nervous system where they are routinely processed. Other signals are routed to the control centers of the cerebrum where they may be processed through the voluntary system. This transmission process is labeled, sublevel 1.1 Sensory Transmission.

When a signal ("message") reaches the cerebrum the brain performs the functions described at 1.1 and 1.2 in the cognitive and affective domains. In addition, the capacity for output (Physical Action Potential) is developed.

Sublevel 1.2: Physiofunctional Maintenance

The capacity to move the body and any of its parts is complicated by the interactions and complimentary blending of functions of the autonomic and voluntary systems. The voluntary system is controlled by thought, and voluntary movements are activated by both hemispheres of the cerebrum. The autonomic system controls involuntary body functions and is a product of the individual's hereditary set and genetic package. Through practice, certain individuals have been known to gain control over portions of the autonomic system (i.e., being

able to control heart beat rates, etc.), but usually creation of the Physical Action Potential is simply the brain's storing of capacities to activate body machinery.

In relation to these functions, the body's autonomic system is continuously performing a maintenance function in order to insure its physical storage and output potentials. This includes not only regular maintenance functions such as breathing, processing of food, etc., but also keeping the brain and its cognitive and affective action potentials in readiness.

Hence, for this classification model, sublevel 1.2 Physiofunctional Maintenance includes the storing and maintenance functions described above.

LEVEL II - ACTIVATING

As an infant develops in muscular control and coordination, various parts of the body become more and more skilled in movement. The psychomotor domain is simply the development of basic physical and sensing skills with gradual increases in cognition. For reasons related to sex, geographic location, parental interest, cultural pressure, etc., individuals develop various degrees or levels of physical coordination.

Three principles are associated with the normal growth cycle of development. The first is called the cephalocaudal principle. It simply means that growth and motor development proceed generally from the head to the tail of the organism. The second is called the proximodistal principle. This principle states that growth and motor development proceed from the axis of the body outward. Gross body movements are gradually replaced by fine body movements. The third

principle is that of motor chaining. The individual becomes more efficient in any motor activity he practices (and it becomes more automatic). Those muscle sequences that are not helpful drop out, and those that are helpful remain and become more and more useful.

Most basic motor coordinating has been accomplished before the child enters school. Objectives at the Activating level often take the form of norms. For instance, by age eight months most infants are crawling. Occasionally a primary teacher may discover that some basic motor skill needs attention. An objective for this particular child may then be in order. As Harrow puts it,

> "It should be obvious that when the "standard model" walks through the kindergarten doorway he should have with him a basic reflex system which has given way to a well developed motor system manifested through a variety of controlled locomotor, non-locomotor, and manipulative movements. His perceptual abilities, which have been developing through maturation and learning since the first four weeks of life when he began his initial practices, utilizing his visual, auditory, and kinesthetic modalities, are ready for further sophistication. Occasionally the "model" or learner who walks through the door to formal education does not have all the essential "equipment" and therefore must have an individualized program developed to assist him in obtaining all the prerequisites to efficient functioning of the psychomotor as well as the cognitive and affective domains of learning."[7]

Sublevel 2.1: Physical Outputs

At the initial stages of Activating, the capacities for body movement are put into motion. A differentiation again must be made between those body machinery efforts that are a product of the automatic system, as opposed to the first attempts made by the organism as a result of conscious voluntary action.

Sublevel 2.2: Mimicry

At sublevel 2.2 Mimicry, the individual simply engages in a modeling behavior after observing the movements of another. There is not a conscious effort to make the mimicry precisely that of the imitated, and there is little thought of retaining the skill in a permanent skill repertoire. It is a moment of effort to produce peculiar body effects; it probably will not be practiced much, and little effort will be made to move it toward the automatic level.

Sublevel 2.3: Deliberate Modeling

If however, there is an attempt to practice for retention and thought is given to making the imitation as close as possible to that of the demonstration, then the individual has moved to sublevel 2.3 Deliberate Modeling. The modeling is conscious and meaningful to the individual. The individual has begun to attempt to develop what is labeled "muscle memory." The skill is one which the individual wishes to be able to "call-up" at any time.

LEVEL III - EXECUTING

When a particular psychomotor skill can be performed to accomplish an understood task without further practice, then the individual has reached the Executing level. When presented with a set of circumstances that demand the use of particular skills, those skills can be executed to complete the task. The typist can insert and type the necessary copy. The basketball player can attempt the free throw. The scientist can manipulate the controls of the microscope. The individual is aware of the necessary skills required and initiates the appropriate

motor responses. She/he can explain the procedure that he/she is following in his/her execution.

Sublevel 3.1: Task Execution

At sublevel 3.1 Task Execution, the individual engages in the appropriate skill automatically. She/he understands why she/he is so engaged and for what ultimate purpose, but little cognition is required in the actual execution. For instance, at this level the individual may simply engage in the act of feeding her or himself, skillfully using all of the table implements. Entire meals may be eaten without cognition about the act of eating, but cognition can be activated if necessary.

Sublevel 3.2: Operational Execution

When cognition must accompany the skill or skills in their accomplishment periodically, then the individual is operating at sublevel 3.2 Operational Execution. At this level much of the execution is automatic, but cognition is necessary at intervals. For instance, in the act of driving a car much of the execution can be done with little cognitive concentration. Periodically however, cognition in directing the executive skills is crucial.

Sublevel 3.3: Skilled Execution

On occasion the individual may find it necessary to concentrate on the execution of skills cognitively a high percent of the time. This would be true of the surgeon in an operation, or the golfer executing a shot. Loss of concentration could cost a life or a stroke. When the individual is so engaged, she/he is operating at sublevel 3.3

Skilled Execution. It is obvious that the highly skilled professional athlete exhibits this level of execution a high percentage of the time.

LEVEL IV - MANEUVERING

At this level the individual must make decisions as to what skills to use in given situations. The individual may try an approach to see if a particular learned skill can be executed to accomplish a desired end. If not, another approach may be substituted. Similarities and differences between the current situation and other situations in the past are considered as an aid in making the decision.

Sublevel 4.1: Inspecting Skills

In the process of executing skills the individual often discovers that others have been able to reach a higher skill level. Also, she/he may surmise that if certain skills are altered or replaced his/her own efficiency at certain tasks may be improved. In this examination of skills, she/he compares his/her skills with others and begins to deduce optimal skill arrangements for particular sets of circumstances. For instance, when the basketball player dribbles down the court with an opponent between her/himself and a teammate who is under the basket, she/he may choose to execute a bounce, chest, baseball, lob or other pass. By comparing this set of circumstances with others, she/he has encountered, she/he is engaging in skill inspection.

Sublevel 4.2: Selecting Skills

Closely related to the inspection process is the periodic trial and selection of specific skills or sets of skills. As improvements are made certain of the trials that are being inspected are adopted.

In actual practice the entire process may involve moving down one or more levels where a new skill (or skills) is modeled and practiced until successfully executed. Thereupon, the skill(s) undergoes repeated trials where it is carefully inspected, refined and/or revised. Ultimately, the process of selection culminates in the rejection or acceptance of the skill(s). For instance, a professional baseball pitcher who is successful on the basis of a "slider" and "fast" ball may at the same time be working to bring his "curve" and "fork" ball past the deliberate modeling stage, through skilled execution to inspection for possible adoption, and on to final selection (or rejection). An implication is that this skill selection leads to an analytical conclusion that is a best answer upon which all professional ball players would agree.

LEVEL V - PSYCHOMOTOR JUDGING

Skill judging involves considerably more cognition than the lower levels. Indeed it is possible that in some circumstances actual psychomotor acts may be absent for the individual making the judgment. That is, she/he may be judging acts engaged in by other people. Whether individuals can make accurate judgments about their own skills while engaged in their execution is a moot point. Even the finest professional golfers will take their swings to another pro for assistance in performative judging.

In operating at the 4.2 Selecting Skills level, in which the "right" answer is determined, circumstances may occur in which there is not an answer to which the logic of the situation leads. At this

moment in time, the individual working with the skills must render a judgment, based on evidence. Because of the number of variables, differences of opinion between people will exist.

Sublevel 5.1: Establishing Performative Criteria

Before rendering a judgment about which skill to use, or how to use a performative skill, the individual must first assemble, analyze and render an opinion about the criteria he/she will use to make the performative judgment. In some instances the criteria are already partially structured for the individual. For instance, at a diving competition, each judge has seen many dives and the criteria used in judging dives has been discussed, argued over and written about. Still, the judge has a slightly different conceptual model of the "ideal" dive, and when assigning a score, the criteria he/she uses will be slightly different than each of the other judges. On occasion, (as in the Olympics) the criteria may include other special considerations (such as the country represented) that will dramatically alter an assigned score.

In other situations a machinist must make his/her own complete set of criteria for judging which of his/her psychomotor skills to bring into play in order to produce a given product. He/she may choose to use a band saw, shaper and surface grinder rather than a radial saw and mill because his/her own psychomotor ability with each has been used as one of the judgmental criteria.

Sublevel 5.2: Performative Judging (Criterial based decision from alternatives)

Once the performative criteria have been established, the final

judgment or series of performative judgments can take place. The individual attempts to make skills assessments (judgments) using his/her own criteria. A coach attempting to assist the baseball hitter, assesses the swing against a conceptualized model of the ideal swing.

Sublevel 5.3: Combining Skills

Often the criteria established and judgments rendered are operationalized because of a desire to build or construct a new product. The pieces may be put together in a variety of ways, but using analytical skills, developed criteria and judgments, the skills are combined to create a new whole. For instance, the football coach may watch game films of a future opponent and form opinions of their capabilities. He also is constantly appraising his own players and their effects upon each other. On the basis of these assessments he may then begin the formulation of game plans. The effectiveness of his game plans is directly related to the validity of a series of interrelated judgments.

LEVEL VI - PSYCHOMOTOR CREATING

Ultimately the individual may allow him/herself to approach the problem of judging solutions by creating an environment in which highly imaginative solutions to skill problems are discovered.

At sublevel 6.1 Performative Exploring, the individual allows the necessary divergence to occur so that untried solutions may be revealed. Should such a solution emerge, sublevel 6.2 Performative

Insight will have occurred.

When John McKay created the "I" formation for football, when the first baseball coach used the Ted Williams shift, when Willie Shoemaker rides an unexpected winner, who can really attest to whether the adjusted skills were a product of judgment or insight?

## FOOTNOTES

1. Ogden, Charles K. and Richards, I.A. The Meaning of Meaning, Routledge and Kegan Paul, Ltd., Broadway House, 68-74 Carter Lane, E.C. 4, England.
2. Upton, Albert W., Design for Thinking, Stanford University Press, Palo Alto, California, 1961.
3. Upton, p. 30-31.
4. Upton, p. 108, "Genus Term" here can be referred to as the language symbol for a concept.
5. William J.J. Gordon, Synectics, New York: Harper and Row, 1961, Chapter 2.
6. For example, two articles dealing with Transcendental Meditation appeared in the December 1972 issue of the Phi Delta Kappan, a highly respected educational journal.
7. A.J. Harrow, A Taxonomy of the Psychomotor Domain, New York: David McKay Co. Inc., 1972.